

# American Potato Journal

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# American Potato Journal

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## TWENTY-FIVE YEARS

The first annual meeting of the Potato Association of America was held at Cornell University on the 10th and 11th of February, 1914. In his presidential address, W. A. Martin stated that "This Association has before it problems that will require a vast amount of patience and labor, such as the development of new and improved varieties, creating standards and encouraging a system of pure seed certification; aiding towards the establishment of distribution and marketing; encouraging a reliable system of crop reporting and one of the foremost problems is that of stimulating the investigation of methods for the profitable utilization of surplus and cull potatoes. To insure permanent prosperity there must be means adopted which will look towards the caring for the surplus in years of over-production."

The Potato Association of America has made valuable contributions to the industry in the twenty-five years of its existence. That this has been possible is due, in considerable part, to the untiring efforts of William Stuart. Others contributed much but it was Dr. Stuart's guiding spirit during the early years that held the organization together.

The twenty-fifth annual meeting will be held at Richmond from the 28th to the 30th of December. Joint sessions have been arranged with the American Society for Horticultural Science and the American Phytopathological Society. Arrangements are also being made to review briefly the changes in the potato industry since the organization of the Association. Titles of papers to be presented at the meeting should be submitted to W. H. Martin before the 15th of November.

A twenty-fifth anniversary is an important event in the life of any organization. We can well afford to review what we have accomplished in the past years and plan for a more active organization in the future. The founders of this Association had a definite objective in mind. It is now our task to carry on the work so ably inaugurated by them.

## SOME COMPARISONS OF DUSTS FOR POTATO LEAF-HOPPER CONTROL ON LONG ISLAND

J. B. SKAPTASON <sup>(1)</sup> <sup>(2)</sup>

*Cornell University, Ithaca, N. Y.*

Insect pests of the potato cause losses in yields, and in certain areas on Long Island are from year to year more of a problem to the grower than late blight. Bordeaux mixture, which has for years been the standard recommendation for the control of fungous diseases as well as leafhoppers and flea beetles, has, under certain conditions, actually caused decreases in yields. This, coupled with mediocre control of leafhoppers, stimulated interest in insecticides other than bordeaux mixture that might offer more effective insect control in these particular areas.

The results obtained from the large scale use of some of these dusts during the past year when leafhoppers were unusually abundant seemed to be of sufficient interest to be reported at this time, although they represent only one year's efforts.

### EXPERIMENTAL METHODS

The dusts were applied at the rate of 35 pounds to the acre at each application with an 8-row Messenger duster mounted on the draw bar of an Oliver tractor and operated by a power take-off. The applications were made when, in the opinion of the operator, they were necessary to control leafhoppers. The Cobbler variety was dusted five times and the Green Mountains six times during the growing season. The dates of applications are indicated on the lower axis of the accompanying graphs by the letter "D." All the materials used were prepared in a Bean self-mixing duster just previous to each application and were as follows:

Rotenone—15 lbs. of 5 per cent root in 85 lbs. of Bancroft Clay.

Pyrethrum—(Powco A)—10 lbs. in 90 lbs. of Bancroft Clay.

Dusting Sulphur—37.5 lbs. (325 mesh Spider Brand) in 62.5 lbs. Bancroft Clay.

3-Way Dust—Pyrethrum 10 lbs., Rotenone 15 lbs., Bancroft Clay 37.5 lbs., and dusting sulfur 37.5 lbs.

<sup>1</sup>Research Assistant, Department of Plant Pathology.

<sup>2</sup>Appreciation is expressed to F. M. Blodgett and G. F. MacLeod for suggestions and criticisms during the preparation of the manuscript.

Copper-lime dust—20 lbs, monohydrated copper sulphate, 80 lbs. hydrated lime.

The experimental plots were properly randomized and the final yields given represent the average of four replications, each of which was about 1/6 of an acre. Leafhoppers were counted on the plants in the field. Such counts were made either early in the morning or late in the evening when the insects were most inactive.

#### EXPERIMENTAL RESULTS ON COBBLERS

The effectiveness of the various dusts in the control of leafhoppers on Cobblers is indicated in figure 1. The decrease in the num-

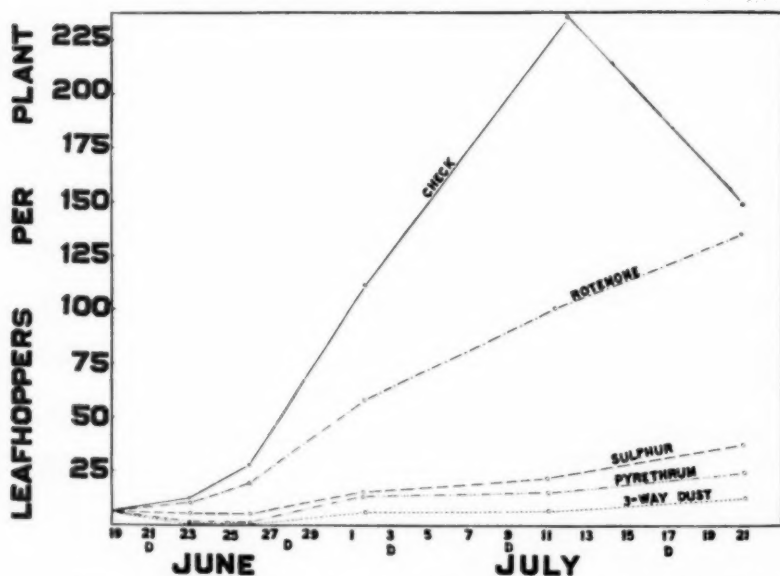


FIG. 1. Effectiveness of various insecticide dusts for the control of leafhoppers (*Empoasca fabae* Harris) on Cobbler potatoes.

bers of leafhoppers to the plant on the check after the 12th of July can be accounted for by the migration to adjacent Green Mountain fields. At this time the check plants had died prematurely showing 100 per cent hopperburn. Rotenone was rather ineffective in the control of leafhoppers and the plants receiving this treatment died about four or five days after the check vines at which time they also showed 100 per cent hopperburn. The condition of the leaves on the 12th of July is



FIG. 2. Condition of leaves on the 12th of July. From left to right: Check, Sulphur dusted, Pyrethrum dusted, dusted with 3-Way mixture. (Rotenone dusted plants on this same date resembled the check).

illustrated in figure 2. The remaining three dusts gave satisfactory control of leafhoppers, the 3-Way mixture being particularly effective throughout the season. Plants treated with the 3-Way mixture remained green longer than plants receiving any other treatment and lived  $2\frac{1}{2}$  to 3 weeks longer than the untreated vines. The plants from the pyrethrum, sulphur and 3-Way dust treatments died primarily from causes other than hopper-burn for at the time of death they showed only 5 to 10 per cent hopperburn.

The plants dusted with the 3-Way mixture consisting of pyrethrum, rotenone and sulfur outyielded all of the others both in total yields and with highly significant differences as regards first size potatoes as shown in table 1. These materials used separately as dusts gave increases in yields over the undusted ones, but these were large enough to be significant for first size potatoes only with pyrethrum and rotenone. Perhaps the simplest hypothesis to account for the success of the 3-Way mixture is that the effect of these different materials is independent and additive. Therefore pyrethrum when used alone increased the yield of first size potatoes compared with the undusted by 37.63 bushels to the acre, the rotenone by 26.25 bushels and the sulfur by 14.00 bushels, making a total of 77.88 bushels. This is not significantly different from the 93.38 bushels on each acre increase produced by the combination mixture of these three materials. The arrangement of the experiment did not permit an evaluation of the insecticidal effects of the Bancroft Clay.

The highly significant increase in yield of the pyrethrum-dusted plants compared with the undusted in first size potatoes might reason-



TABLE I.—*Final yield in bushels on each acre of Cobbler potatoes at Huntington, Long Island, N. Y.*

1937

Treatments	First Size (Not Pass through 2" Opening)	Second Size (Passes through 2" Opening)	Total
Check	240.00 <sup>1</sup>	36.87 <sup>1</sup>	276.87 <sup>2</sup>
Rotenone	266.25	27.5	293.75
Sulphur	254.0	30.25	284.25
Pyrethrum	277.63	29.13	306.75
Sulfur-Rotenone-Pyrethrum	333.38	36.87	370.25

Source of Variance	Degree of Freedom	Sums of Squares	Variance	F
Treatments	4	11,198.8625	2,799.7156	13.02*
Blocks	3	1,708.5187	569.5063	....
1st and 2d size tubers	1	586,245.1562	586,245.1562	2,725.82*
Treatments 1st and 2d size	4	9,734.3875	2,433.5969	11.32*
Error	27	5,806.9188	215.0711	....
Total	39	614,693.8437		
Treatment vs. check	1	2,175.6250	2,175.6250	10.12*

\*Significant with odds greater than 100:1.

<sup>1</sup>Difference necessary for odds 20:1 = 21.28.

Difference necessary for odds 100:1 = 28.73.

<sup>2</sup>Difference necessary for odds 20:1 = 30.09.

Difference necessary for odds 100:1 = 40.63.

ably have been expected from the leafhopper control, but this does not account for the also highly significant increase in yield of first size potatoes of pyrethrum-dusted over sulfur-dusted plants. Rotenone dust, with relatively poor leafhopper control, gave a significant increase in yield compared with the undusted, whereas sulfur dust alone, with leafhopper control comparable to the pyrethrum and 3-Way dusts, did not give significant increases in yields.



The only other insects which were abundant on the experimental plants were flea beetles. Aphids were relatively scarce averaging approximately 40 to the plant. The Colorado potato beetles were not a factor so far as final yields were concerned as they were eliminated by two earlier applications of arsenate of lead.

#### RESULTS ON GREEN MOUNTAIN POTATOES

This experiment was designed primarily to compare copper-lime dust with a dust mixture of pyrethrum, rotenone and sulfur (3-Way dust) both for the control of insects and the ultimate effect on potato yields. The procedure and materials used in this experiment were essentially the same as in the preceding test.

Both copper-lime and the 3-Way dust markedly reduced the numbers of leafhoppers as compared with the check plants. The untreated vines on the 29th showed 100 per cent injury by hoppers while at the same time plants dusted with copper-lime showed only 25 per cent injury. However, those plants treated with the 3-way mixture showed only 10 per cent injury on this same date. The amount of hopper-burn on the plants was approximately proportional to the number of leafhoppers as shown in figure 3.

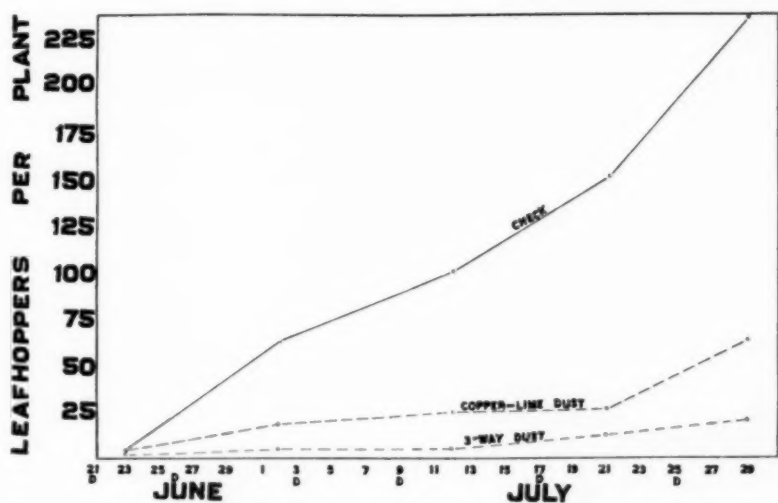


FIG. 3. Effectiveness of dust mixtures for the control of leafhoppers on Green Mountain potatoes.

Plants receiving the 3-Way mixture remained green about  $2\frac{1}{2}$  weeks longer than the check plants. In the case of the check plants hopperburn was probably the primary cause of their premature death. Plants dusted with the copper-lime dust died about a week later than the check and about a week and a half before the plants dusted with the mixture of pyrethrum, rotenone and sulfur. The death of both the copper-lime dusted plants and those treated with the pyrethrum, rotenone and sulfur was probably brought about largely by drought and hot weather, although the copper-lime dust may have caused some injury and contributed to the earlier death of these plants.

TABLE 2.—*Final yield in bushels on each acre of Green Mountain potatoes, Huntington, L. I.*

1937

Treatments	1st Size	2d Size	Total
Check	207.5 <sup>1</sup>	40.0 <sup>1</sup>	247.50 <sup>2</sup>
Cu-lime	246.75	38.75	285.50
3-Way	276.25	52.50	328.75

Source of Variance	Degree of Freedom	Sum of Squares	Variance	F
Treatments	2	6,610.7500	3,305.3750	23.34*
Blocks	3	312.3750	.....	.....
1st and 2ds	1	239,406.3750	239,406.3750	1,690.38*
Treatments: 1st and 2d	2	3,368.2500	1,684.1250	11.89*
Error	15	2,124.3750	141.625	.....
Total	23	251,816.1250		

\*Significant with odds greater than 100:1.

<sup>1</sup>Differences necessary for significance (odds 20:1) 17.93 bu.

<sup>2</sup>Differences necessary for significance (odds 20:1) 25.36 bu.

The final yield results recorded in table 2, show the highest yields from plants dusted with the 3-Way mixture where leafhoppers were best held in check. At the peak of leafhopper infestation there were

58 hoppers to the plant on the copper lime-treated plants whereas the 3-Way mixture had reduced the infestation to 18 on each plant. Since no late blight occurred in these plots, it is possible that the higher yield obtained from the 3-Way mixture compared with the copper-lime dust may have been due to the control of some insects other than leafhoppers although there were no appreciable numbers of other species apparent on the vines. There is also the possibility of a stimulative action of pyrethrum. In 1936, on this same field, a reduction in yield of 60 bushels on each acre resulted from the use of bordeaux mixture.

### DISCUSSION

In the potato dusting experiments on Long Island during the past year, using both the Cobbler and Green Mountain varieties of potatoes, improved control of potato leafhopper was obtained with a pyrethrum-rotenone-sulfur dust. The increases in yields may be caused in part by the control of the leafhoppers but it seems unlikely that these increases in yield can be attributed entirely to leafhopper control since in this respect pyrethrum and sulfur behave much alike although influencing yields quite differently, which suggests a stimulating effect by the pyrethrum or an injurious effect of the sulfur when used alone. Although copper-lime dust afforded some control of the potato leafhoppers the pyrethrum-rotenone-sulfur dust was significantly more effective and gave an increase in yield of 43 bushels to the acre when compared with the copper lime dust.

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### POTATO CONFERENCE AT PRESQUE ISLE, MAINE, AND FREDERICTON, NEW BRUNSWICK

F. J. STEVENSON<sup>1</sup>

If further evidence were needed that potato breeding problems and objectives cut across state lines and international borders and involve large regions of the entire country, it could be found in the 1938 conference of scientists cooperating in the national potato breeding program. Since this program was inaugurated a few years ago cooper-

<sup>1</sup>Senior Geneticist, Division of Fruit and Vegetable Crops and Diseases, B.P.I., U.S.D.A.

atively between the state experiment stations and the U.S.D.A. these summer conferences have been considered a part of the potato breeding work and the results to date indicate that they are one of the most important parts. Within recent years several interesting summer meetings have been held but in one way the 1938 conference marked a step in advance of the others since this was a joint meeting of Canadian and United States workers interested in potato improvement and pathological problems. The group spent three days, from the 22d to the 24th of August, inclusive, at Presque Isle, Maine, and one day, the 25th of August, at the Dominion Experimental Farm, Fredericton, New Brunswick.

Seventy-one people representing 17 states, 5 provinces of Canada and Cuba attended the meeting at Presque Isle and 57 representing 13 states, 5 provinces and Cuba were in attendance at Fredericton. Because of rain on the 22d of August on which day a meeting was scheduled to be spent in the field, our time was spent in the discussion of various problems. Dr. Fred Griffie, Director of the Agricultural Experiment Station of the University of Maine, of which Aroostook Farm is a branch, welcomed the conference to Presque Isle. He spoke of the many problems involved in potato growing and made reference to some of the results in the breeding work which indicate a solution of some of the worst difficulties by this mode of attack. F. A. Krantz, who is in charge of the vegetable investigations at the University of Minnesota, St. Paul, and who has had a wide experience in potato breeding, led the discussion on breeding methods. He reviewed some of his work in developing self fertile breeding material, inbred lines and recombinations of these lines in crosses. From the standpoint of breeding for commercial varieties his most promising results were obtained by selfing for a few generations, selecting the most promising inbred lines and top-crossing to a good commercial variety. He is of the opinion based on many observations that all other things being equal the variety that produces the most fruit, that is seed balls and seed, will produce smaller yields of tubers than one that produces no fruit. He has an experiment now in progress designed to give definite information concerning this question. In the discussion that followed it was brought out that many of the problems in potato breeding and pathology are physiological in nature and the cooperative efforts of well trained physiologists are needed in their solution.

Since the expansion of the potato breeding work in the south is in progress a discussion of the breeding problems in that section led by

Julian C. Miller of Louisiana State University was of interest to all. He pointed out that all the present potato varieties had been developed in the north. Some of these are fairly satisfactory but results obtained with seedlings grown and selected in Louisiana indicate that varieties can be produced far superior to any of those grown there at present. Miller was followed by A. H. Eddins, of the Florida Agricultural Experiment Branch Station, at Hastings, Florida. He enumerated some of the problems that confront Florida growers, the list being very much like one that would be given for northern growers. He told of the tests he has been making for resistance to bacterial brown rot and other diseases on material furnished by the U.S.D.A. from Presque Isle, Maine, and Beltsville, Maryland. There are indications of resistance to this disease in some of the lines.

J. M. Jenkins, Jr., of the South Carolina Truck Experiment Sub-station, Charleston, South Carolina, indicated that the need of the South Carolina growers is a variety as early as Irish Cobbler with superior market and cooking quality and resistant to the virus diseases. Leaf-roll caused considerable damage in South Carolina during the past season. H. H. Zimmerly, Superintendent of the Virginia Truck Experiment Station, Norfolk, Virginia, indicated that the problems in his state were similar to those in South Carolina. It is not the intention of Virginia to develop a full breeding program but to depend on the other states and the U.S.D.A. to furnish tubers of the most promising new varieties for tests on the eastern shore. According to Robert Schmidt of the North Carolina State College, Raleigh, North Carolina, the potato breeders in that state have two sets of problems: one in the early eastern shore area; the other in the late mountain areas. The eastern shore problems are similar to those of South Carolina and Virginia, the problems of the late mountain areas resemble those of some of the northern states. Early varieties for the eastern shore are now being tested with some promise of obtaining better varieties than the Irish Cobbler. As a result of the work in the higher altitudes one new variety will be described and named during the coming year. It is a high yielding variety, and is resistant to leaf-hopper injury and late blight. It is not known whether or not it will be adapted to conditions in other parts of the country. Through all the discussion the interdependence of the north and the south was very apparent. If varieties are obtained especially adapted to the south they will have to produce satisfactory crops in the north and in Canada if the south is to depend on these sections for their seed. Until some of the physiological problems involved in growing seed in

a hot climate are solved it is evident that this practice must continue. The discussion on field techniques was led by J. R. Livermore of Cornell University. The importance of, and the difficulties in getting reliable data, were also stressed. The group was cautioned against the temptation of trying to patch-up unreliable data with statistics. At the same time it was pointed out that statistical methods would help greatly in the analysis and interpretation of reliable data. We visited the various plots on Aroostook Farm on the 23d of August and studied the work being done by the Maine Agricultural Experiment Station and the problems being attacked by the U.S.D.A. in cooperation with the Maine Station.

Arthur Hawkins of the Maine Agricultural Experiment Station gave an interesting paper on rotation of crops and the use of various fertilizers in potato growing, stressing the results obtained from the application of some of the so-called rare elements. The value of this work could readily be seen in the differences in the rotation plots which resulted from the different treatments.

Gedes W. Simpson, Assistant Entomologist of the Maine Agricultural Experiment Station discussed insects and their relation to the spread of plant diseases. According to Dr. Simpson, the leaf-roll spread in the certified potato seed of 1937, was due to the fact that during that season approximately 75 times as many peach aphids were found in the potato fields of Maine as were found in previous seasons. The difficulty from leaf-roll arose at that time, not because of neglect of seed growers or inspectors but from a condition for which they were in no way responsible. Reiner Bonde, Associate Plant Pathologist of the Maine Agricultural Experiment Station discussed briefly his work with sprays and spray materials in relation to the control of late blight. Large differences could be observed between the various plots. Some treatments gave almost complete control, others were much less efficient. The potato breeding and pathological work of the United States Department of Agriculture carried on in cooperation with the Maine Agricultural Experiment Station came up next for consideration. Although this work might be considered by some to be carried on in the interests of Maine alone, those present could readily see that the problems are regional and international in their scope. No one state or one country has a corner on the virus diseases of potatoes, neither are such diseases as late blight or common scab confined to any small area. Extensive studies are being conducted at Aroostook Farm on these diseases and breeding for resistance is being given major emphasis in the program. The Maine Agricultural



Experiment Station cooperates fully in this work but there are no restrictions on the amount or kind of material that is sent to other cooperating state experiment stations. Maine has proved to be a desirable place to do potato breeding work. There are only a few places in the United States where true seed can be obtained in amounts necessary to carry on an extensive breeding program and Maine is one of the best of these. Seedlings can be raised with a minimum of effort and expense and the most desirable ones can be increased rapidly. Resistance to many diseases can be studied there to the greatest advantage. Foundation breeding stock, true seed, seedlings before they are closely selected for Maine conditions and named or numbered seedling varieties are sent to any of the cooperating stations that can make use of them. Besides providing material for cooperating stations and for most of the potato breeding and pathological work conducted at Beltsville, Maryland and at Charleston, S. C., breeding for yield, earliness, market and cooking quality, as well as resistance to such diseases as mild, latent and vein-banding mosaics, spindle tuber, leaf-roll, late blight and common scab is being conducted. To those who made a survey of the field plots it was clearly evident that progress is being made on a number of these projects. Of special interest to the people from the early potato states were a number of new high producing early varieties of superior market quality. For a number of years very few early varieties were produced in the breeding work at Presque Isle because no good early pollinators were available. For the last few years, however, hundreds of early seedlings have been obtained by sib mating earlies and medium earlies and by backcrossing to earlies. Several series of these have been tested in Louisiana, South Carolina and Virginia with promising results.

High yield and market quality are not difficult to obtain but little, if anything, is known about the inheritance of culinary quality, and so far little progress has been made in determining this. The difficulties lie in the fact that standards for superior table quality are variable. In one section of the country a dry mealy potato is demanded, in another section one that is less mealy is not discriminated against provided it has high market quality. In estimating quality, texture, flavor, color of flesh, especially freedom from the tendency to blacken when exposed to the air after cooking must all be given consideration. All these characteristics are subject to variation even in tubers of the same variety. Some varieties seem to be more variable than others. All the potato breeders at the conference agreed



that the problem is complex but despite its complexity, greater emphasis must be placed on it in the work of the future.

The discussion of the work in viruses was led by E. S. Schultz who demonstrated in the greenhouse and with the cages in the field, the techniques and the extent of the work necessary to identify the various virus diseases, separate them one from another, and keep them separate. The interdependence of the plant breeder and pathologist is illustrated best in the breeding for resistance to the virus diseases. Little knowledge, if any, would be had concerning the inheritance of resistance to these diseases if it had not been for the preliminary work of Dr. Schultz, Dr. Folsom and others in classifying the viruses and bringing order out of chaos and less would be known about the behavior of the viruses if it were not for the new productions of the plant breeders. The results of the breeding work to date have given hundreds of seedling varieties resistant to mild mosaic in the field, a large number of others resistant to mild mosaic in the field and immune to all the known forms of the latent mosaic group of viruses. The vein-banding group is now being attacked and it is hoped before long that varieties will be available that are resistant to all of these mosaics. Resistance to leaf-roll and to spindle tuber is being studied at Presque Isle, supplemented by comparatively large field tests at Beltsville. Tests for leaf-roll resistance are conducted also by Dr. Folsom at Highmoor Farm, Maine. No varieties with a high degree of resistance are yet available but it was shown by the 1938 epidemic that leaf-roll spreads more slowly in some varieties than in others. The same may be said for spindle tuber.

The work of breeding for scab resistance was described by C. F. Clark. Demonstration material from the scab tests indicated a high degree of resistance in some of the seedling lines. The most promising seedling varieties from the commercial standpoint inherited their resistance to scab from Richter's Jubel, or Hindenburg, although some degree of resistance is to be found in Golden, Russet Burbank, Russet Rural, and in selfed lines of Katahdin. Scab resistant varieties would have an advantage not only on land where scab is now the limiting factor in growing a profitable crop of potatoes but also in sections where scab can be held under control by soil management. It is quite possible that soil management to control scab is not the most efficient in raising potatoes. If commercial varieties were available highly resistant to scab it would be possible in some sections to lime the soil, produce better legume crops and as a result obtain higher yields of prime potatoes.

The late blight-resistance plots incited much interest on the part of the conference. These plots were sprayed with blight spores instead of bordeaux mixture during the growing season. This season the blight started early and continued to fruit late so that all susceptible lines were killed about the middle of August. All the Green Mountain checks were dead and the killing was caused by the blight organism as shown by the fact that in other experiments in which this variety was carefully sprayed with bordeaux it was still green and continued to grow for at least another month. Although none of the seedling varieties escaped entirely many of them showed little or no injury resulting from the disease. A seven-acre field of Sebago, a new blight resistant variety, one of the products of this program, was given many favorable comments by those present. This field was not sprayed for blight control throughout the season and still showed little injury from the disease in contrast to many farmers' fields of Green Mountains that had been sprayed regularly and were already dead or nearly dead despite attempts to control the disease. Reiner Bonde, who is studying late blight resistance in tubers, stated that he has yet to find tubers of the Sebago rotting in the ground because of late blight. This is in contrast to the Green Mountain in which he has found more than 50 per cent of the tubers developing rots at digging time. He stated too that he found the Sebago somewhat more resistant to scab than the Green Mountain. If the Sebago can be grown and marketed to advantage it will save the farmers much expense and drudgery in the production of the potato crop.

One point of interest in connection with the blight problem was brought out at the conference. It was suggested that it was important for states where late blight epidemics occur infrequently to have resistant varieties as well as for states such as Maine where potatoes have to be sprayed every year. It was shown that the occasional epidemic caught the growers unprepared with efficient spray equipment and the losses were comparatively heavy. If resistant varieties were available such losses would not occur.

A field trip under the direction of Verne Beverley, County Agent of Aroostook County, was planned for the 24th of August. Visits to the potato starch factory, to a large commercial storage house and to an up-to-date farm storage were of interest to all those present. Because of rain the remainder of the trip, which had as its objectives the observation of some of the certified seed potato fields and large fields of table stock, was cancelled. The group returned to Presque Isle and left for Fredericton, New Brunswick, in the afternoon.

C. F. Bailey, Superintendent of the Dominion Experimental Station at Fredericton, and his associates did everything in their power to make the meeting there a pleasant and a profitable one. It was evident from the papers presented and the discussion following the papers that some excellent work in potato breeding and pathology is being done by our neighbors across the Canadian border and that it will be to the mutual advantage of every one to further the cooperation already begun and the friendly feeling that was so evident throughout the week.

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### AMERICAN POTATO BREEDERS VISIT CANADA

L. C. YOUNG

*St. Paul, Minn.*

The American Potato Breeders' and Pathologists' Meeting in annual session at Presque Isle on the 22d, 23d and 24th of August, concluded their conference by holding a one-day meeting at the Dominion Experimental Station, Fredericton, N. B., on Thursday, the 25th of August.

The trip from Presque Isle to Fredericton was made by motor, the delegates arriving in Fredericton in the late afternoon and early evening, and were accommodated, for the most part, in the Agricultural School dormitory.

Both morning and afternoon sessions were held on Thursday. C. F. Bailey, Superintendent of the Station, acting as chairman of the meetings, heartily welcomed the visiting delegates, especially those from the United States, to the Fredericton Station, and extended an invitation to the Conference to return again at some convenient date in the future.

A number of speakers appeared on the program in an attempt to explain the nature of the Fredericton Potato Breeding Program and the progress made to date.

Potato breeding in Canada was more or less spasmodic until 1933, when the Dominion Department of Agriculture centralized its potato breeding activities at the Dominion Experimental Station, Fredericton, N. B. The program is in the nature of a cooperative project between the Horticultural Division of the Experimental

Station and the Laboratory of Plant Pathology, directed by a local committee consisting of C. F. Bailey (chairman), L. C. Young and R. J. White, representing the Experimental Station and D. J. MacLeod and J. L. Howatt, representing the Laboratory of Plant Pathology. This committee in turn is responsible to divisional headquarters in Ottawa.

The program is fairly wide in scope, and includes such studies as resistance to mild mosaic, resistance to late blight and resistance to common scab. Some preliminary work has also been done in connection with frost resistance and starch content.

J. L. Howatt outlined the method of attack in breeding for resistance to the common diseases, the technique followed in determining the resistance of seedlings, and the actual progress made to date in this connection.

D. J. MacLeod, pathologist in charge of the local laboratory, gave a very comprehensive address on potato viruses, explaining the complex nature of some of the more common viruses, and emphasizing the necessity of adopting the most modern methods in disease resistance studies.

The results of the aphid survey and study in New Brunswick were included in an address by Miss Jean Burnham, of the local Entomological Laboratory. As in the State of Maine, the unusual spread of leaf roll during the season of 1937 was thought to be caused by the prevalence of the peach aphid in much greater proportions than in preceding years.

The Fredericton program differs from that of many institutions in that most operations are conducted under greenhouse conditions, rather than in the open field. The development of the special technique, which has made this procedure not only possible but also desirable, was explained by the writer, who stated that it was possible to effect pollinations during every month of the year, providing proper conditions of humidity, temperature and light were maintained.

The after-dinner speakers included Dr. F. J. Stevenson of the United States Department of Agriculture, M. B. Davis, Dominion Horticulturist and H. T. Gussow, Dominion Botanist.

At the conclusion of the indoor sessions in mid-afternoon, the delegates were given the opportunity of inspecting the growing material in the field and greenhouses. The conference then adjourned, a few members extending their visit to the Maritime Provinces, and the rest returning directly to the states.

## THE HIGH PLAINS POTATO WORKERS HOLD CONFERENCE IN WYOMING

G. H. STARR

*University of Wyoming, Laramie, Wyo.*

The third annual meeting of the High Plains Potato Workers was held from the 19th to the 21st of August in southeastern Wyoming in the vicinity of Laramie.

The group met at Pine Bluffs and after a brief tour of a few potato fields in that area, visited the Cheyenne Horticultural Field Station with the object of seeing the potato-variety psyllid test.

The next morning the potato workers inspected the potato plots at the Agronomy Farm, near Laramie. These plots consisted of variety tests, date-of-planting, certified potato samples, fertilizer experiments, virous disease-spread tests, treatment experiments and potato plots of miscellaneous potato diseases.

During the afternoon the members motored up to the University Summer Camp forty miles distant and at an altitude of 10,000 feet in the Snowy Range. At this camp the round-table discussions were held during the remainder of the afternoon and evening and even extended into the wee small hours of the night. The author, as president of the group, selected certain subjects for discussion and had asked qualified leaders to take charge of these discussions. The subjects and leaders were as follows:

"Potato Psyllid Yellows and Psyllids"—L. B. Daniels

"Potato Breeding in the Improvement Program"—W. C. Edmundson

"Certification Problems"—Marx Koehnke, Carl Metzger and Glen Hartman

"Factors Influencing the Storage of Potatoes"—Dr. H. O. Werner

"Disease Problems"—Dr. R. W. Goss

Following the discussions, a business meeting was held in which some important matters were discussed and acted upon. Among these, the chairman was authorized to appoint representatives from each state to draw up a resolution outlining the general problems of psyllids and psyllid control and requesting the assistance of the Bureau of Entomology, United States Department of Agriculture, in correlating work and in giving active assistance to control work as well as

to other phases of this problem. The following members were appointed: L. B. Daniels, chairman (Colorado); Glen Hartman (Wyoming) and Haskell Hankins (Nebraska).

Another measure that passed was as follows: "In view of considerable uncertainty of standards for disease tolerance in certified seed, that this group request the cooperation of the United States Department of Agriculture in conducting tests to determine the amount of yield reduction by specific amounts of disease content."

Another matter acted upon unanimously was that this group go on record as opposing the proposed potato law HR 10853 for the reason that it is based on a false assumption and that the representatives of the three states transmit this information to congressmen and to members of the United States Department of Agriculture.

The group elected Haskell Hankins, Extension Specialist from the University of Nebraska, as president of the conference for the coming year. These meetings will be held in Nebraska.

Fishing, sight seeing, informal discussions and an illustrated lecture on the "Formation of the Rocky Mountains" by Dr. H. S. Knight, Professor of Geology at the University of Wyoming, constituted the Sunday morning program.

Those present at the conference were: Philip A. Hoff, W. C. Peterson, J. G. McLean and Marx Koehnke of Alliance, Nebraska; T. H. Hankins, Dr. R. W. Goss, Dr. James H. Jensen, Dr. H. O. Werner and Dr. Carl Rosenquist of the University of Nebraska, Lincoln; H. M. McLean and Leslie Bowen of Scottsbluff, Nebraska; Dr. George M. List, C. H. Metzger, Dr. Charles R. Jones and L. B. Daniels of Colorado State College, Ft. Collins; Ralph Manuel of Minturn, Colorado; W. C. Edmundson, Dr. L. A. School of Greeley, Colorado; Joe G. Richard of Louisiana State University, Baton Rouge; Henry M. Darling, Gulf Coast Experiment Station, Fairhope, Alabama, and Glen Hartman, Dr. W. B. Owen, Dr. G. H. Starr and Dr. A. F. Vass of the University of Wyoming, at Laramie.



## SECTIONAL NOTES

### CALIFORNIA

The marketing of Stockton Delta potatoes continues in an orderly manner. The prices are steady,—best grades bringing from 85 cents to \$1.00 per cwt. f.o.b. Ranch—depending on the quality.

Potato consumption in California seems to be increasing; the report issued by the Department of Agriculture covering unloads in Los Angeles (Carloads and Trucks combined) shows:

August, 1938 .....	912 cars
August, 1937 .....	791 "
August, 1936 .....	620 "

There have been more potatoes exported through San Francisco this season than ever before, because of the fact that a large volume of potatoes has been going to Manila.

The Klamath Falls District has experienced killing frosts and heavy digging will begin about the 10th of October. The crop promises to be very good quality; there is estimated between 8,000 to 10,000 carloads. Our present prices range from \$.55 to \$.65 per cwt., plus sacks. (Oct. 8).—E. MARX.

### COLORADO

Harvesting is well under way and should be completed in another week. Abandonment has been nearly as prevalent as in 1931 and 1934, and in the majority of the fields the yields and quality are very disappointing. This is one of those rare years when the available storage in the San Luis Valley is not full. It is estimated that nearly 7,000 cars can be stored. The trucks are taking a higher percentage of the crop than usual and growers and dealers estimate that one-half to two-thirds of the Valley crop will move by truck compared with thirty per cent last year.

The condition in the rest of the state is even worse than in the San Luis Valley. Growers estimate that there will be approximately one-third of a crop in the Greeley District and one-third to one-half of a crop on the Western Slope. The size of the potatoes is generally small and the quality poor.

The reasons for the poor crop this year are: firstly, one of the



heaviest infestations of psyllids in several years; secondly, a frost on the 18th of August which affected all the higher altitudes including the San Luis Valley and a large part of the Western Slope; and thirdly, a general epidemic of bacterial wilt.

The certified seed fields reveal one bright spot in an otherwise very disastrous season. These fields were, in practically all cases, properly sprayed, and the yields will be approximately normal. The demand has been far ahead of previous years and many growers have already sold all their stock at \$1.50 per hundredweight for the January delivery. All yields are running from 180 to 320 sacks to the acre under irrigation and from 40 to 150 sacks to the acre on the dry land. (Oct. 13).—C. H. METZGER.

#### INDIANA

Our late potato harvesting operations are now in full swing. Many of our growers anticipated finishing by the 20th. Some very large yields have been reported from our muck soil area with several yields above the 600 bushel mark. Chippewa, Katahdin, Cobbler and White Rural are giving the best yields of good quality potatoes.

Conditions are ideal for harvesting and the price is as good as could be expected.

A potato show will be held in connection with the Northern Indiana Muck Crops Show from the 15th to the 18th of November at Walkerton, Indiana. (Oct. 7).—W. B. WARD.

#### MAINE

Practically all harvesting operations were completed by the 12th of October. Since the 1st of October, weather conditions have been almost ideal for harvesting and for general farm work and the change has been very welcome. Reliable data indicate seven inches of rainfall above the normal during the growing season, which gives an indication of the difficulties experienced in growing potatoes this year.

General estimates place shipments this year at 40,000 cars; some a little higher and others a little lower, but the average is at that figure.

Growers and shippers are experiencing some real difficulty in storing potatoes as a number of lots have already started to go bad. Many lots are being run over the grader now and re-placed in stor-

age. This practice will probably be carried on extensively with the advent of cold weather.

Shipments are running light at the present time, and there is some speculative interest in potatoes, both in seed and table stock which is indicative of confidence that the future will bring higher price levels.

There is a concerted effort to secure a starch diversion program similar to last year even though the Marketing Agreement was not approved. To date efforts have not met with success and just recently some interest has been aroused in asking for resubmission of the Marketing Agreement in another referendum. This is an unusually favorable time for the operation of a Marketing Agreement much more effective than would be more true in years of heavier production. (Oct. 13).—FRANK W. HUSSEY.

#### MASSACHUSETTS

A 14.55-inch rainfall was recorded at Amherst during September, established on all-time record for this state. Nearly 12 inches of this occurred during the stormy period from the 17th to the 21st of September, the storm that caused some flooded areas. This period has fortunately been followed by fine weather to date.

Not more than one-half the crop was harvested previous to the storm because the excessively wet period temporarily suspended digging operations and considerable rot is in evidence.

The total loss of a limited acreage of several hundred acres, resulting from the July floods, has been followed by a similar loss by other growers because of the heavy deposits from the September flood.

Otherwise, yields in most cases of well-sprayed fields are running above the average, but, with some increase in rot in the recently harvested crop, yields may be reduced slightly. Leafroll has been prevalent in Chippewas, but the growers still think well of this variety although some question regarding their storage qualities is raised. The recent trend of increased prices has been encouraging to growers. (Oct. 11).—RALPH W. DONALDSON.

#### MONTANA

The annual meeting of the Pacific Northwest Potato Growers' Association will be held in Spokane, at the Davenport Hotel, on the

18th and 19th of November. We are expecting a rather good conference this year, in that we have the promise of representatives from not only the four Northwest states but also from British Columbia, Colorado, Utah, and possibly from Wyoming.

We have had a rather peculiar fall so far. Up to this date, we have had practically no frost in the state except that which occurred in August. The potato vines are as green as gourds in most places, and growers are getting rather apprehensive that the first frost that is sufficiently severe to kill the vines will also kill the potatoes. If conditions are favorable, our potato harvest should be about completed this week, but as it stands, it is hardly begun. (Oct. 13).—  
E. R. BENNETT.

#### NEBRASKA

At this time the harvesting operations in Nebraska are well under way and nearly complete in the irrigated districts. In the case of the dry land growers, many are just beginning to dig. The chief cause for delay is due to the fact that we have had very mild weather, with no frost to kill the vines. The green vines interfere greatly with picking. Since the danger of freezing in the ground is considerable at this time, all growers will be harvesting, and will be practically finished by the 15th of October.

The yields being secured are the most variable we have seen in Nebraska for many years. As a whole, the most unsatisfactory yields are being secured under irrigated conditions. Practically no potatoes are yielding more than 300 bushels, whereas in the normal season, 500 bushels are not at all uncommon. Many irrigated yields are reported as low as 40 and 50 bushels to the acre, and in a few cases, the yields are so low that they are not being harvested. These extremely low yields are principally caused by the heavy infestation of psyllids which are still being found in fields that are green. Those fields, which would have yielded 500 bushels under ordinary conditions, were cut from 100 to 200 bushels to the acre, because early blight caused them to mature more than a month ago. Therefore, since early blight and psyllids prevailed in the irrigated territories, the yields will be substantially less than one-half of the average production.

The dry land yields are quite variable, but generally speaking, they will run in the neighborhood of 75 bushels on each acre. Very few fields are to be found that will not be harvested. An occasional

field is running as high as 150 bushels to the acre, with some rarely above that figure. Dry land potatoes, as a whole, are of good quality, though they are going to be small. This is to be contrasted with the irrigated crop, which is troubled with a great many factors causing poor quality.

Psyllids always cause off-type tubers, whereas flea beetles produce what is known as worm track. In addition to these symptoms some areas are affected with scab.

No definite price has been established for certified seed potatoes at this time, since it is not desirable to make extensive quotations until the size of the crop is quite well known. Table stock prices are ranging in the neighborhood of 65 cents per cwt. for good graded potatoes from the field. (Oct. 10).—MARX KOEHNKE.

#### NEW YORK

Because of late blight, which started in some western New York fields in late July and increased rapidly in early August, we had expected the potato crop estimate for September to be below that for August. However, the same estimate of 27,250,000 bushels was reported. We now feel sure that the October report should show considerable shrinkage. That portion of the crop already dug indicates yields generally below those of 1937. In northern New York, although blight was not serious, yields are reported to be about 75 bushels to the acre below normal. In western New York, where blight was more serious and August extremely hot, yields are much below those of last year. Plants generally set a large number of tubers but because of the high temperature they are yielding tubers of smaller than average size. On Long Island, the early crop was excellent in both yield and quality. However, the late crop of Green Mountains, especially on the south shore of Suffolk County was seriously affected with blight. There was considerable loss of the crop on account of the hurricane which prevailed during the latter part of September.

The crop of certified seed produced in New York will be about the same as in 1937. Very few sales have been made, because the growers are inclined to wait for more information on supply and demand as to a basis for making prices. Nearly one-half of the certified seed grown in New York is marketed through the New York Cooperative Seed Potato Association, Georgetown, New York.

Announcement has just been made regarding the annual winter convention of the Empire State Potato Club. It will be held at Hotel Seneca, Rochester, N. Y., on the 5th and 6th of January, 1939. It will feature an educational program for growers, a competitive seed and table potato show, trade exhibits, 4-H show and judging contests. As usual, this will be a joint convention with the New York State Vegetable Growers' Association of which Henry Marquart of Orchard Park is President. Roy A. Porter, of Elba, is president of the Empire State Potato Club. (Oct. 14).—E. V. HARDENBURG.

#### NORTH DAKOTA

The acreage of seed potatoes that North Dakota finally passed on inspection to qualify for certification, has increased this year, but because of the dry weather, during the latter part of the growing season, the total production will be no greater than last year. In fact, according to present indications, before the harvest period is completed, it appears possible that the total volume will be even less than last year. The 1937 season was an unusually productive one for this state, and we obtained enormous yields on each acre at that time. A comparison of the acreage of potatoes finally accepted for certification in 1938, as compared with 1937, follows:

	Acres Certified	Acres Certified
Certified Potato Varieties	1938	1937
Triumphs .....	6,538	4,380
Cobblers .....	7,042	6,611
Ohios .....	1,342	717
Misc. ....	89	117
Total .....	15,011	11,825

Ideal weather conditions are prevailing during the North Dakota potato harvesting period, and the stock harvested is going into storage in unusually fine condition and appearance. Also, from the standpoint of the health and vigor of the seed stock, all evidence, at present, points to a crop of unusually strong vigor and freedom from disease. Field inspection standards were materially strengthened in this state this year, and all stock that passed certification is of the highest possible standard.

According to the official inspection records in North Dakota,

approximately  $\frac{2}{3}$  of the seed stock from the entire acreage which passed certification, either contains no virus disease at all or does not exceed  $\frac{2}{10}$  of one per cent. The seed from the balance of the acreage meets a standard which is very close to this;  $\frac{1}{2}$  of one per cent is the maximum amount of any disease permitted in North Dakota certified seed potatoes, and this figure is considerably below the limit recommended by the National Certified Seed Potato Conference at Baton Rouge, last April.

Regarding the potato situation in general, this state has already exported 3,000 car loads of potatoes. The Federal Surplus Commodities Corporation has established itself in the Red River Valley and is making purchases of common potatoes of U. S. No. 1 or commercial grade. This activity has considerably strengthened the market situation in this area. (Oct. 8).—E. W. GILLIG.

#### OHIO

The yield of the late potato crop was materially reduced by the hot, dry weather during the latter part of August and the first of September. The crop in Ohio last year was small and this year's crop will be only slightly larger than that of 1937.

The Cobbler crop has been marketed and prices are materially better at the present time. At the time the Cobbler crop was being harvested, the market was quite low and it was very difficult to move potatoes. Prices have materially advanced and the movement is much better. (Oct. 11).—EARL B. TUSSING.

#### OREGON

Potato marketing started in fairly good volume by the middle of September, a total of 610 acres being shipped during that month. The weather was warm and therefore caused some loss. Some potatoes also showed immaturity. All prices ranged from 90 cents during the early part of the month to approximately 65 cents during the latter part of the month, f.o.b.

The general quality of the crop is good with more large size table stock than usual. The yields should be above normal and the quality about normal. It is generally estimated at the present time that the average yield will be in excess of 300 bushels to the acre or between 6,000,000 and 7,000,000 bushels for the district.

There is considerable interest in certified White Rose among the California growers. (Oct. 8).—C. A. HENDERSON.



## PENNSYLVANIA

The harvesting of the certified seed potato crop in this state is practically completed. The yields of both Russet Rurals and White Rurals are reported light. Although the crop was harvested in good condition and is of good quality, the size is medium to small as a result of a heavy set and the dry weather that prevailed during the latter part of the growing season. Our certified acreage this year is approximately 10 per cent less than last year.

The crop estimate has just been released and many of the growers are of the opinion that it is still too high for this state.

An unusually large demand for seed potatoes has been evident. Twelve cars of seed have already been sold this fall in Potter county, three cars of which have been tagged and shipped. Our growers were receiving \$1.00 for each bushel f.o.b. storage, for fall shipment. (Oct. 14).—K. G. BEACHLEY.

## RHODE ISLAND

The digging of the late crop is in full swing. Where a thorough spraying program was followed throughout the season, some exceptionally fine yields are being reported. Several fields of Green Mountains are yielding more than 500 bushels to the acre. Some small fields of Chippewas turned out equally well. The leaves on the vines of some late-planted fields of Green Mountains were stripped by the hurricane on the 21st of September before the crop was fully made. The yield will be somewhat reduced on these fields, although there is a good average yield. Poorly sprayed fields are showing light yields because of the severe blight during August. This is another year that thorough spraying has made a big difference in results with the crop. On an average, in our state, including the well managed and well sprayed fields as well as those that were not, the total crop will probably show a considerably lower average yield than last year because of the blight. (Oct. 13).—T. E. ODLAND.

## SOUTH DAKOTA

The potato crop in South Dakota is spotted. The yields range from 50 bushels to 180 bushels on each acre. The drought during the latter part of July cut promised yields, but the quality of the stock is excellent. Digging will be completed this week, with 90 per cent now in the bin. Twenty-two cars of certified Bliss have



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been shipped to Florida. The balance is in storage for later shipment.

Potatoes, despite the low price, are the best money crop our farmers raised this year. An increase in the certified acreage is anticipated in 1939. All the commercial stock is moving to truckers at 50 cents to 75 cents per hundred, depending on the quality.

J. W. Weston of Goulds, Florida, has supervised the growing of an acreage tributary to Watertown, and expects to extend operation in 1939. (Oct. 10).—JOHN NORNAN.

#### VERMONT

In a rough survey of farm damage caused by the storm and hurricane of the 21st of September, comparatively little loss has been reported in potatoes. Most fields had not been harvested and it is probable that even where damage has been reported it was caused mostly by late blight rot which was already present before the storm. The potato warehouses at Greensboro and Bellows Falls, where a large part of Vermont certified seed is stored, were in no wise injured.

The final compilation of acreage certified for seed is 411. This figure is higher than was at first estimated, although it is about 50 acres lower than the figure for 1937. The yield is reported as being comparatively light owing to the poor set and the growing season which seemed to force a luxuriant growth of the vines. (Oct. 11).—H. L. BAILEY.

#### WASHINGTON

Our field inspections of the certified seed potato crop for the 1938 season are practically completed. We find that the percentage of rejections this year is a little larger than 1937, owing to more current infections of virus diseases.

The extreme drought west of the Cascades has affected our yield quite seriously. The yield on each acre is about 25 per cent less this year than last. Even in the irrigated sections, the quality and tonnage is lighter than ordinary because of the high temperatures and unfavorable growing conditions.

The White Rose variety is practically all sold and a considerable quantity has already moved to market. We expect large shipments of this variety to continue during the next three weeks. As

# **New Jersey Certified Seed Potatoes**

**Irish Cobbler    Chippewa  
Jersey Redskins**

For twenty years New Jersey certified seed potatoes have proven to be vigorous, high yielding and, because of the size of the tubers, economical. Leading growers in Pennsylvania and New Jersey have demonstrated the value of this seed.

## **List of Growers available.**

***For information—Communicate with—***

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State Department of Agriculture,  
Trenton, N. J.**

**FRED BRUNNER, Jr., Cranbury, N. J.**

**GEORGE I. BALL,  
County Agricultural Agent,  
Salem, N. J.**

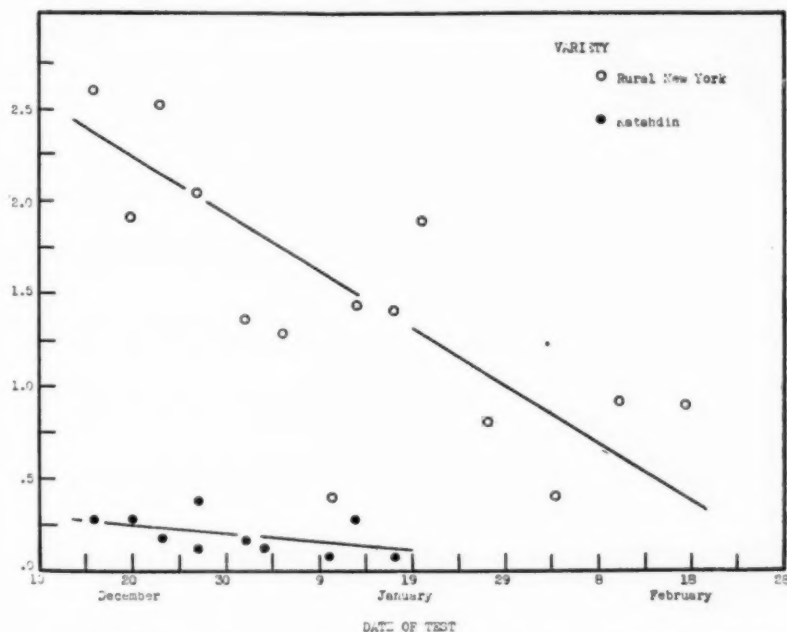
**F. A. RAYMALEY,  
County Agricultural Agent,  
Bridgeton, N. J.**

you no doubt know, the White Rose is being used in southern localities where planting usually begins in January. This, of course, accounts for the early movement of the White Rose potatoes. The price received by growers ranges from \$20.00 to \$35.00 for each ton. The lower prices received have been for shipments into new localities with the purpose of opening up a wider outlet.

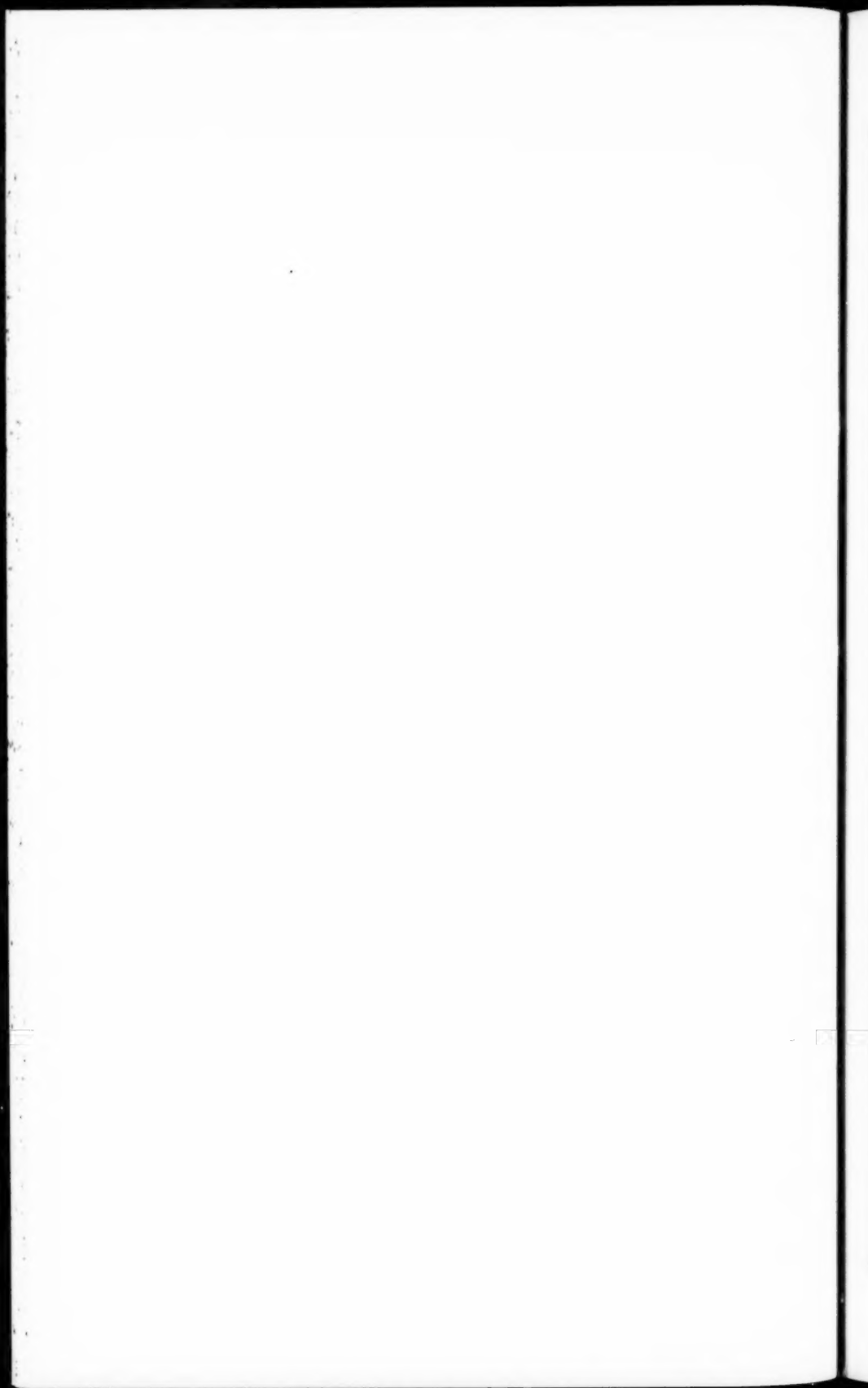
The movement of commercial potatoes has been unusually active this fall. Practically the entire crop grown west of the Cascades has already moved into commercial channels, much of it moving into the Pacific Coast markets and the Hawaiian Islands. (Oct. 10).—Chas. D. Gaines.

#### ERRATA

In the article "The Sloughing of Potatoes" by Mark A. Barmore, June, 1938, p. 171, line 1 should read, "As a result of Rathsack's work, an experiment was conducted in this laboratory ———." The following graph mentioned on page 171, paragraph 2, line 1, should be inserted.



In the article by W. H. Burkholder, in the September issue, page 244, line 12, should read "Asparagin 1 gram," instead of "6 grams."



# POTASH DELAYS FROST INJURY

Potatoes which have been able to get an ample supply of plant food throughout the growing season will withstand light frosts in the early fall. Experiments show that while fertilizers cannot protect potatoes against temperatures below 30 degrees F., there is no doubt but that a vigorous plant has a higher concentration of cell sap and can withstand light frosts without injury.

Many soils on which potatoes are grown are deficient in potash, and enough of this essential plant food should be applied so that the vigor of the plant will be preserved to maturity and the supply of potash will not be exhausted before the crop has reached its growth.

To insure a good crop against potash deficiency, apply at least 200 pounds of  $K_2O$  per acre.

Consult your county agent or experiment station about the fertility of your soils. See your fertilizer dealer or manufacturer. You will be surprised how little it costs to apply enough potash to insure good yields.

Write us for additional information  
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